# CHAPTER 5 - PYPSCAN

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## ARTICLE 1 - General

### PMCS

The Project Management Control System (PMCS) is a computerized system for monitoring and controlling projects in the district's delivery program from the early planning phase to completion of the contract.

### PYPSCAN

PYPSCAN is a subsystem of the PMCS. The acronym stands for "Person Year and Project Schedule and Cost Analysis." PYPSCAN was created to fill the need for a systematic and uniform method of estimating project schedules and support requirements. Estimates are based on historical project data, tempered by engineering judgments regarding process changes and productivity enhancements. PYPSCAN factors are continually being compared to accomplished schedules and support expenditures for project, program, and budget monitoring purposes; the factors are then updated as appropriate.

PYPSCAN forecasts, reports, and monitors capital-outlay-related resources (personnel, time, dollars) needed to develop and deliver Caltrans' multiyear capital program (see Figure 1). PYPSCAN Person-Year (PY) results serve as the basis for Caltrans' Capital Support budget and are used for forecasting personnel needs. PY results and schedules are accepted by the Department of Finance and the Legislature as the basis for Caltrans' project and program delivery requirements.

### Capital Scheduling Plan

The Capital Scheduling Plan (Figure 1) is a three-part document covering all resources for the multiyear capital program. This three-part document includes the following:

- Capital Outlay Schedule (Dollars)
- Milestone Schedules (Time)
- Technical Support Schedules (Personnel)

The plan contains all authorized projects, including on-going construction and right-of-way acquisition projects, State Transportation Improvement Program (STIP) projects, long lead-time projects, locally funded projects (oversight PYs), et cetera.

## Milestones

The thirty PYPSCAN milestones are shown in Figure 2 and defined in Figure 3. Each milestone serves as the terminus for a series of interrelated activities. Each activity may involve the participation of one or more functional units (Surveys, Materials, Right of Way, etc.). Each of these activities is described in the *Project Development Workflow Tasks Manual*. (See Chapter 1, Section 2, for a document description.)

## Milestone Control Plan

The heart of PYPSCAN is the Milestone Control Plan (see Figure 2). The three phases of a transportation project are: (1) Project Planning Phase; (2) Project Design Phase; and (3) Construction Phase. In Phase 2 (Project Design Phase) a simple "critical path" analysis can be made to determine the control timeline between project design, right of way, and structures design. This ensures that Right of Way and Structures Design have enough time for their parts of the project. Any changes to their time lines must be negotiated.

## Milestone Dates

There are three sets of milestone dates for each PYPSCANed project. The three sets are: (1) status dates input by districts; (2) target dates agreed upon between districts and Headquarters; and (3) PYPSCAN calculated dates. Target dates are key dates: they are the project schedule dates, and the basis for PY allocations.

FIGURE 1 - Automated Capital Scheduling Plan through PYPSCAN

SCHEDULING
CURVES

WORK
NORMS

PMCS DATA
(without
P.Y.s &
MILESTONES)

PYPSCAN  FACTORS
• P.Y.s / $1,000 CONTRACT COSTS
• TIME & P.Y. %s BETWEEN MILESTONES
• COMPLEXITY  FACTORS

PROJECT  FACTORS
• PROJECT VALUE
• PROJECT TYPE
• PROGRAM
• ENVIRONMENTAL
• LOCATION
• PARCELS REQUIRED
• CONSTRUCTION WORK DAYS

PYPSCAN
(PYRS)

PROJECT
MILESTONES
and P.Y.s

AUTOMATED
UPDATE
PROCESSING

CAPITAL  SCHEDULING  PLAN

MILESTONES

SUPPORT  P.Y.s

CAPITAL
DOLLAR
SCHEDULES

PYPSCAN
REPORTS

PMCS
(with P.Y.s &
MILESTONES)

# FIGURE 2 - PYPSCAN Milestone Control Plan



(0 – 200)
PROJECT PLANNING PHASE

• PROJECT STUDY REPORT
• ENVIRONMENTAL STUDIES
• DRAFT PROJECT REPORT
• PROJECT & ENVIRONMENTAL
  DOCUMENT APPROVAL

(200 – 480)
PROJECT DESIGN PHASE

• DESIGN STRUCTURES
• DESIGN ROADWAY/FACILITIES
• ACQUIRE & CERTIFY RIGHT OF WAY
• ADVERTISE
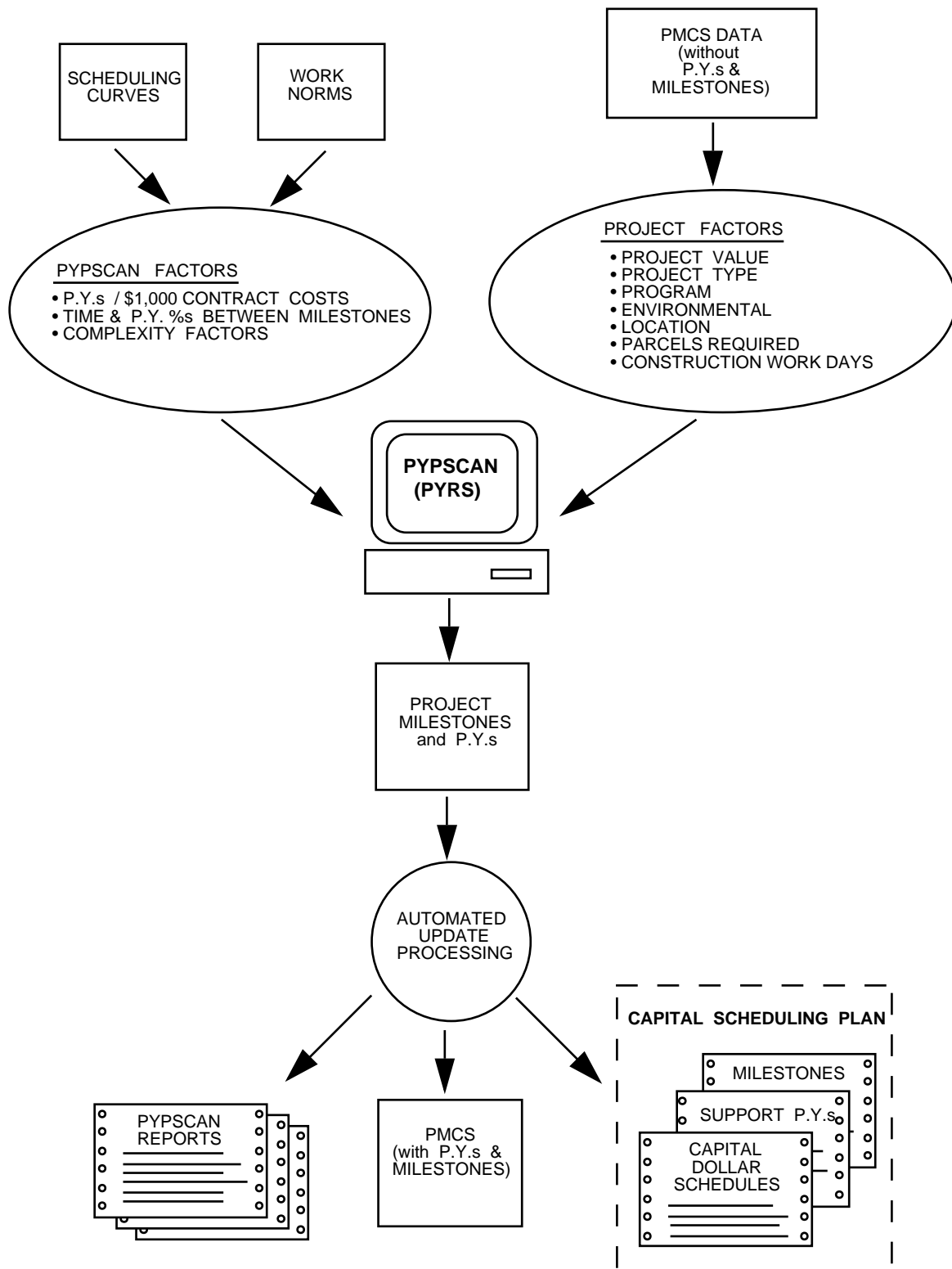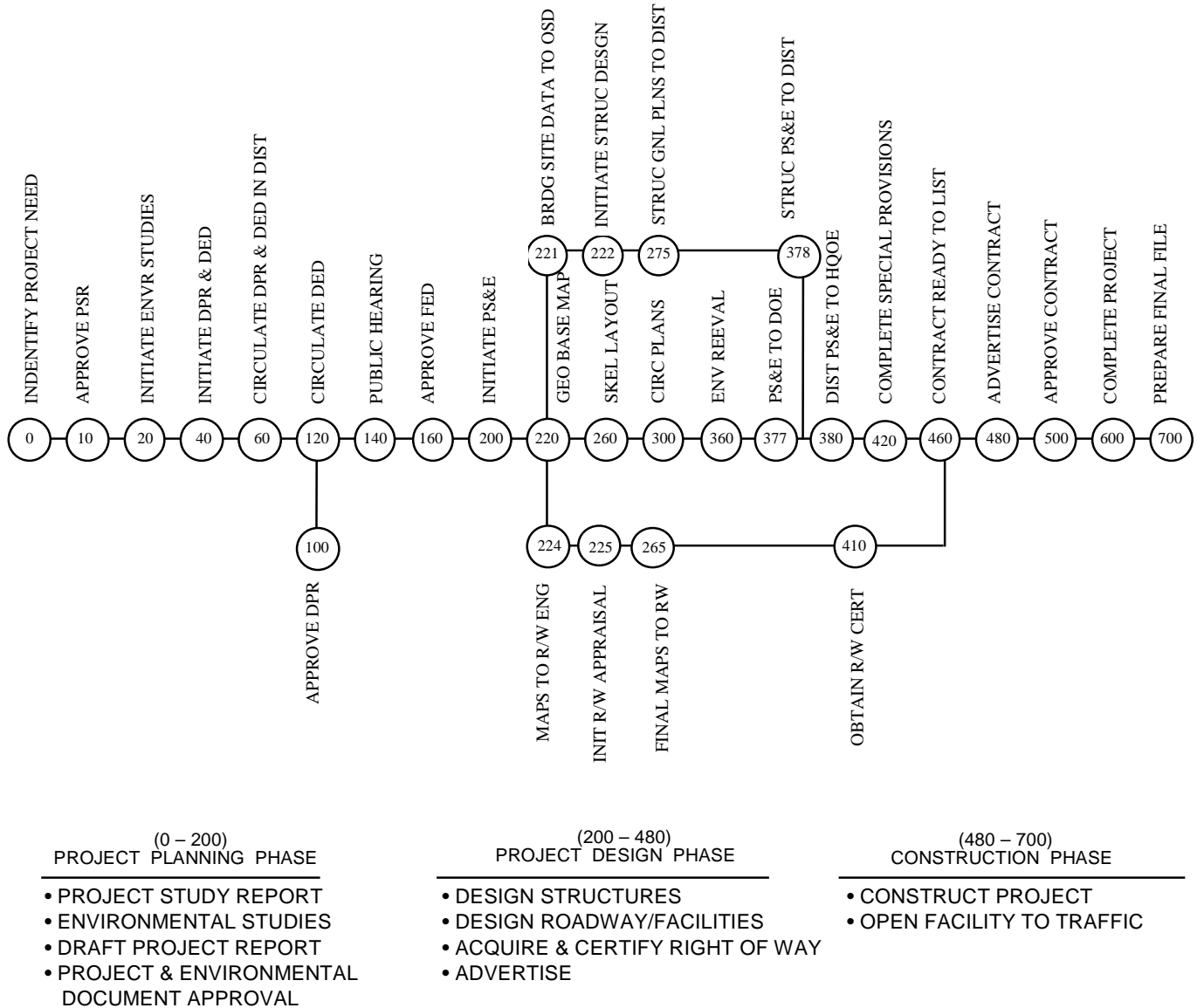
(480 – 700)
CONSTRUCTION PHASE

• CONSTRUCT PROJECT
• OPEN FACILITY TO TRAFFIC

NOTE:   MILESTONES 377 AND 420 ARE NOT PYPSCAN MILESTONES.
        THEY WERE ADDED TO REFLECT THE OFFICE ENGINEER
        FUNCTION IN THE DISTRICTS AND HEADQUARTERS.

# FIGURE 3 - PYPSCAN Milestone Definitions

| | |
|---|---|
| 000 | IDENTIFY PROJECT NEED AND BEGIN PROJECT STUDIES<br>Date district identifies project need and begins project studies |
| 010 | APPROVE PROJECT STUDY REPORT<br>Date district approves Project Initiation Documents |
| 020 | INITIATE ENVIRONMENTAL STUDIES<br>Date district initiates environmental studies |
| 040 | INITIATE DRAFT PROJECT REPORT & DRAFT ENVIRONMENTAL DOCUMENT<br>Date district initiates Draft Project Report and Draft environmental document |
| 060 | CIRCULATE DRAFT PROJECT REPORT & DRAFT ENVIRONMENTAL DOCUMENT IN DISTRICT<br>Date district circulates Draft Project Report and Draft environmental document within the district |
| 100 | APPROVE DRAFT PROJECT REPORT<br>Date district approves Draft Project Report |
| 120 | CIRCULATE DRAFT ENVIRONMENTAL DOCUMENT<br>Date district approves circulation of the Draft environmental document to local agencies, clearing-houses, etc. |
| 140 | CONDUCT PUBLIC HEARING<br>Date district conducts public hearing |
| 160 | APPROVE FINAL ENVIRONMENTAL DOCUMENT<br>Date district approves the Final environmental document |
| 200 | APPROVE INITIATION OF PS&E<br>Date district approves initiation of PS&E |
| 220 | COMPLETE GEOMETRIC BASE MAPS<br>Date district completes the geometric base maps |
| 221 | SEND BRIDGE SITE DATA TO STRUCTURES DESIGN<br>Date district submits bridge site data to Office of Structures Design |
| 222 | INITIATE STRUCTURES DESIGN<br>Date Division of Structures initiates structures design |
| 224 | SEND MAPS TO RIGHT OF WAY ENGINEERING<br>Date district sends maps to Right of Way Engineering |
| 225 | INITIATE RIGHT OF WAY APPRAISALS<br>Date District Right of Way initiates Right of Way appraisals |
| 260 | DISTRIBUTE SKELETON LAYOUTS TO FUNCTIONAL UNITS<br>Date district distributes skeleton layouts to functional units |
| 265 | SEND FINAL MAPS TO RIGHT OF WAY<br>Date district sends final maps to Right of Way |
| 275 | SEND STRUCTURES GENERAL PLAN TO DISTRICT<br>Date Office of Structures Design sends structures General Plan to district |

| 300 | CIRCULATE PLANS FOR REVIEW<br>Date district circulates plans for review |
|------|------|
| 360 | COMPLETE ENVIRONMENTAL REEVALUATION<br>Date district completes the environmental reevaluation |
| *377 | COMPLETE PS&E AND SEND TO DISTRICT OFFICE ENGINEER<br>Date district completes PS&E and sends to District Office Engineer |
| 378 | SEND STRUCTURES PS&E TO DISTRICT<br>Date Office of Structures Design sends Structures PS&E to district |
| 380 | SEND DISTRICT PS&E TO OFFICE OF OFFICE ENGINEER<br>Date district sends PS&E to Office of Office Engineer |
| 410 | OBTAIN RIGHT OF WAY CERTIFICATION<br>Date district obtains Right of Way Certification |
| *420 | COMPLETE SPECIAL PROVISIONS<br>Date Office of Office Engineer completes Special Provisions |
| 460 | DETERMINE CONTRACT IS READY TO LIST FOR ADVERTISING<br>Date Office of Office Engineer determines contract is Ready to List for advertising |
| 480 | ADVERTISE CONTRACT<br>Date Office of Office Engineer advertises contract |
| 500 | APPROVE CONTRACT<br>Date Caltrans approves contract |
| 600 | COMPLETE CONSTRUCTION PROJECT<br>Date district accepts completed construction project |
| 700 | PREPARE FINAL PROJECT FILES<br>Date district completely prepares final project files |

* MILESTONES 377 AND 420 ARE NOT PYPSCAN MILESTONES.  THEY WERE ADDED TO REFLECT THE OFFICE ENGINEER FUNCTION IN THE DISTRICTS AND HEADQUARTERS.

# ARTICLE 2 - Project Management and PYPSCAN

## Resource Needs & Evaluation

The resources required to accomplish each project (as well as its associated functional activities) must be established early in the project development process.  PYPSCAN is the starting point for establishing the project resource budget.  PYPSCAN can generate a Person Years (PY) estimate for the following functional units:

- Preliminary Engineering and Design
- Structures Design
- Right of Way
- Highway Construction
- Structures Construction

- District Branches

  – Surveys
  – Environmental
  – Materials
  – Traffic
  – Hydraulics

Once estimated resource requirements for a project are determined using available project management software, the results should be compared with the PYPSCAN estimates for capital outlay support, with district PY allocations, and with the status of available district staff. To analyze the district's total staffing needs, individual project PY estimates should be summarized to see if conflicts exist between the PYPSCAN totals and the district's PY allocations.

## Locally Funded Projects

The design of locally sponsored projects is sometimes begun by the sponsor or the sponsor's consultant before environmental documentation is completed. PYPSCAN, however, is designed for projects on which design does not start before environmental documentation is completed and cannot handle a project which is being designed while the environmental document is being prepared. The only way to show design before environmental documentation completion in PMCS is to treat that project as two separate projects, one for environmental documentation and one for design. The "0" and "1" phases should be shown in PMCS as if they were separate projects.

## PYPSCAN and Project Programming

In developing a project work plan, the Project Manager should utilize a project control system (project management software) that monitors and supports the needs of individual projects, as well as the needs of the district and Headquarters management. At the present time, the selected project control system must be compatible with the PMCS and use PYPSCAN milestones.

"Critical Path Method" charting is a basic tool for optimizing project management, because it identifies anticipated product delivery dates. A preliminary project schedule can be developed through PYPSCAN, but the selected project control system should be used as early as possible.

PYPSCAN is interrelated with the Delivery Plan, Status of Projects, Capital Outlay Allocations, and the STIP. As a result of this interrelationship, it is essential to re-PYPSCAN projects when changes occur. As project schedules and cost estimates are updated, this new information must be incorporated into the PMCS database to keep it accurate. It is through the PMCS database that Caltrans Department Management keeps abreast of any schedule or cost changes that occur on Caltrans projects.

The PYPSCAN Unit II Monitoring System (PUMS) provides Project Engineers and Project Managers with the following:

- Detail- and summary-level reports displaying project estimates and actual expenditures (monthly)
- Milestone targets and actual accomplishments
- Listing of upcoming scheduled milestones
- Standardized reports
- Special purpose reports (upon request)

For assistance in using PYPSCAN or the PMCS, schedulers and Project Control Specialists should refer to the *Project Management Control System (PMCS) User Manual* (dated Aug. 1992).

## Office of Project Management Control Systems

The Headquarters Office of Project Management Control Systems (Project Management Program) develops and manages the PYPSCAN system. They maintain and enhance the system, collect and analyze historical information to update PYPSCAN, provide engineering cost reports, and can also provide user training. Any questions related to PYPSCAN and its relationship to project management should be directed to this office.

## Coordination with "Project Development Workflow Tasks Manual"

PYPSCAN milestones and data have been incorporated into the *Project Development Workflow Tasks Manual.* This document provides detailed descriptions and flowcharts for project development tasks from project initiation through Final Report on the completed project.

# ARTICLE 3 - PYPSCAN Reports

## Management Reports

Management reports produced from PYPSCAN are directed at the information needs of managers at every level, from Project Manager through Department Director. These reports can be produced in various formats, including detail reports, charts, and graphs. To allow maximum flexibility for managers, PYPSCAN reports provide project selection and multisort capabilities.

Most PYPSCAN reports can be ordered electronically via various PMCS computer screens available through the PMCS. For assistance in ordering reports, contact district Project Management personnel or Headquarters.

## Data Warehouse

The Data Warehouse combines Project Management Data from the PMCS with Project Expenditure data from the Transportation Accounting Management System (TRAMS) and PS&E Status data from the Office Engineer PC (Personal Computer) Data Base into a relational file that can be used for special project management reporting. A Data Warehouse Coordinator in each district is the expert in using the Data Warehouse. This resource can be used to supplement PMCS reporting to obtain project management data in a timely manner.

# ARTICLE 4 - Future Project Management Tools

## New System

The project management functions currently provided by PMCS and PYPSCAN are in the process of being transferred to a new system. This system, known as the Project Scheduling System (PSS), consists of the eXpert Project Manager$^{TM}$ (XPM), an Oracle database containing project data, and related products. The system is not fully defined and integrated at this time and therefore PMCS and PYPSCAN will continue to be used to plan and track projects for some time into the future. However, the role of these systems will change as the new tools become operational.

## XPM

Starting early in 1997, project schedules and resource needs will be entered into XPM, which is the project management software product adopted by Caltrans. Work plans using the Work Breakdown, the Resource Breakdown and the Organization Breakdown Structures (refer to Chapter 8, Section 4 for further discussion), will be developed for each project and loaded into XPM. The status of each activity will be entered into the system monthly and the plans updated as needed. It is intended that these XPM workplans will be used to produce future Capital Outlay budgets, manage projects and monitor project delivery.